UTILITY PATENT APPLICATION

TO ALL WHOM IT MAY CONCERN

Be it known that I, Barry S. Grant, residing at Route 1, Box 1900, Dahlonega, Georgia 30533, a citizen of the U.S.A., have invented certain new and useful improvements in a

Fuel Pressure Accumulator with Filter And Repositionable Fuel Delivery Ring

of which the following is a specification.

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Signature

TITLE OF INVENTION

Fuel Pressure Accumulator with Filter And Repositionable Fuel Delivery Ring

CROSS REFERENCE

[0001] Applicant claims the benefit of Provisional Patent Application 60/409,807, filed September 10, 2002.

FIELD OF THE INVENTION

[0002] This invention involves a fuel pressure accumulator for use between the outlet of a fuel pump and the internal combustion engine of a self-propelled vehicle, particularly for high performance vehicles, to dampen the high and low pressure pulses in the fuel.

BACKGROUND OF THE INVENTION

[0003] During the operation of an internal combustion engine that performs under varying loads, speeds, pressures and performance requirements, it is desirable to maintain a substantially constant fuel pressure feeding to the fuel injectors and carburetors for the engine. Typically, the source of fuel leading to the engine provides some pulses in its pressure because of the various other operations in the system, such as the opening and closing of valves, the changes in demand on the engine, etc.

[0004] In order to accommodate the various unpredictable changes in fuel pressure, it is desirable to use a fuel pressure accumulator in the fuel line between the fuel pump and the engine. The typical fuel pressure accumulator includes a chamber that is partitioned with a flexible diaphragm. An air chamber is maintained on one side of the diaphragm and a fuel pressure accumulation chamber is formed on the other side of the diaphragm.

Fuel is fed into and exhausted from the fuel pressure accumulation chamber. When there is a pulse in the pressure of the fuel feeding into or leaving the fuel pressure accumulation chamber, the air pressure on the remote side of the diaphragm responds, either by flexing away from the higher, oncoming fuel pressure, or flexing toward the drop in fuel pressure, with the air pressure behind the diaphragm and the resiliency of the diaphragm accommodating the changes in fuel pressure. This dampens the pulses in pressure of the fuel leading to the carburetor or fuel injectors. The end result is that fuel is fed to the engine with a more uniform, predictable fuel pressure.

[0005] While the prior art fuel pressure accumulators have functioned as described above, there is a need for a filter to be combined with the accumulator and a means to visually inspect the filter without having to disassemble the accumulator. There is also a need to provide a fuel pressure accumulator that includes an outlet port that can deliver fuel from a plurality of positions about the accumulator so that the engineer/mechanic can direct the fuel in the most desirable direction toward the carburetor or fuel injectors, or to direct the fuel away from an obstruction in the engine compartment. It is to these features that this invention is directed.

SUMMARY OF THE INVENTION

[0006] Briefly described, the present invention comprises an improvement over the prior art fuel pressure accumulators. An embodiment of the invention includes an accumulator having a segmented body with a fuel delivery ring between the front wall and the rear wall, with the fuel delivery ring having one or more fuel outlet ports. An adjustable connection between the fuel delivery ring and the front wall of the

accumulator allows the fuel delivery ring and its fuel outlet port to be detached, rotated , and re-attached to assume different angular positions about the fuel pressure accumulator. This permits the engineer/mechanic involved with the engine compartment to connect the fuel delivery port in the direction desired, usually toward the carburetor or fuel injectors, without requiring the conduit to extend from à remote position about the fuel pressure accumulator, thus making the installation and maintenance procedures more convenient and expedient for the installer.

[0007] Another embodyment of the invention is a fuel delivery ring that has two or more fuel delivery ports for connection to fuel delivery lines leading to the fuel injectors of carburetors.

[0008] Another embodiment combines the first two mentioned embodiments so as to provide better versatility of connection of the fuel conduits to the fuel pressure accumulator.

[0009] In addition, a fuel filter is placed in the fuel accumulation chamber, between the fuel inlet port of the front wall and the fuel outlet ports of the fuel delivery ring. The fuel filter spans the fuel accumulation chamber, between the fuel delivery ring and the front wall of the segmented housing, and a sight glass is incorporated in the body of the fuel accumulator so as to enable the mechanic to view the dirty side of the filter in the fuel accumulation chamber.

[00010] Thus, it is an object of this invention to provide an improved fuel pressure accumulator for an internal combustion engine that includes a repositionable fuel delivery ring for convenience in placing its fuel delivery port at a desired attitude within the engine compartment of the vehicle.

[00011] Another object of this invention is to provide an improved fuel pressure accumulator that includes a removable and replaceable filter, with a sight glass that enables the mechanic to view the accumulation of dirt, etc. on the dirty side of the filter in the fuel accumulation chamber.

[00012] Other objects, features and advantages of the present invention will become apparent upon reading the following specification, when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[00013] Fig. 1 is a perspective view of the exterior of the fuel accumulator, with this embodiment having one outlet port.

[00014] Fig. 2 is a perspective view of a fuel accumulator, similar to Fig. 1, but having two outlet ports.

[00015] Fig. 3 is a cross-sectional view of the two outlet port fuel accumulator.

[00016] Fig. 4 is an expanded perspective illustration of the two outlet port fuel accumulator.

DETAILED DESCRIPTION

[00017] Referring now in more detail to the drawings, in which like numerals indicate like parts throughout the several views, Fig. 1 illustrates the fuel accumulator with a single outlet port 10, that includes a segmented housing 12 having a front wall 14, a rear wall 16 and a fuel delivery ring 18, with the segments 14, 16 and 18 of the housing being held together at their perimeter by perimeter bolts 20. A fuel inlet fitting 22

communicates through front wall 14 with the segmented housing, and fuel outlet fitting 24 communicates through the fuel delivery ring 18 with the segmented housing. A sight glass 26 is received in an opening of the front wall 14.

[00018] Fig. 2 shows a similar fuel accumulator that has a similar segmented housing but includes two delivery ports. The segmented housing 32 includes a front wall 34 and a rear wall 36 that are substantially identical to the front and rear walls of Fig. 1, and a fuel delivery ring 38 that includes two fuel delivery ports 42. A single fuel inlet port 44 provides the fuel that passes through the fuel accumulator.

[00019] Because of the similarity of the embodiments of Figs. 1 and 2, Figs. 3 and 4 illustrate the fuel accumulator 30 that has two delivery ports.

[00020] As illustrated in Fig. 3, rear wall 36 is dome-shaped, includes a reinforcing ring 46, and defines a concave interior wall 48 that forms a rear wall interior cavity 50. The rear wall 36 is substantially circular and includes a circular O-ring groove 52 that accommodates an O-ring 54.

[00021] Front wall 34 has an interior wall surface 58 that defines a front wall interior cavity 60 that faces and is aligned with the rear wall interior cavity 50. Inlet port 44 communicates with front wall interior cavity 60.

[00022] Sight glass opening 62 is formed in front wall 34, displaced from inlet port 44, and is aligned with front wall interior cavity 60. As shown in Fig. 4, the sight glass lens 64 is mounted in the sight glass opening 62 with an O-ring 66 and a snap ring 68.

[00023] Fuel delivery ring 38 includes an interior circular inwardly facing wall surface 69 that defines a circular chamber 70.

[00024] Circular chamber 70 is aligned with the rear wall interior cavity 50 and the front wall interior cavity 60, with the interior cavities 50 and 60 and the circular chamber aligned with the longitudinal centerline 71 of segmented housing 12.

[00025] Flexible diaphragm 72 has its perimeter 74 clamped between rear wall 36 and fuel delivery ring 38, with the O-ring seal 54 sealed between the rear wall and the flexible diaphragm.

[00026] Fuel filter 76 is positioned with its perimeter 78 clamped between the fuel delivery ring 38 and front wall 34, with an O-ring seal 80 positioned in the O-ring groove 82 of the front wall 34, sealing the front wall to the fuel delivery ring 38.

[00027] With this arrangement, fuel enters the fuel inlet port 44 of the segmented housing 12 and passes through the front wall interior cavity 60, then through the fuel filter 76 and into circular chamber 70 of the fuel delivery ring 38, and then out of the delivery ports 40 and 42 of the fuel delivery ring 38. The filter 76 blocks the movement of any trash, etc. carried with the fuel, keeping the trash from passing on to the engine. Thus, the front wall interior cavity 60 and the circular chamber 70 function as a fuel accumulation chamber, with the front wall interior cavity 60 functioning as an unfiltered fuel accumulation chamber and the circular chamber 70 of the fuel delivery ring functioning as a filtered fuel accumulation chamber.

[00028] In the meantime, when a change in pressure, in the form of a pressure pulse, occurs in the fuel accumulation chamber 60, 70, the flexible diaphragm 72 will move in response thereto. If the pressure suddenly increases, the flexible diaphragm will move toward the rear wall interior cavity 50, which increases the pressure of the air or other gas in the rear wall interior cavity 50, thus increasing the resistance that the gas applies

to the inwardly moving flexible diaphragm 72. This offer more resistance to the increase in pressure of the fuel.

[00029] Likewise, should the pressure of the fuel in the fuel accumulation chamber 60, 70 suddenly decrease, the pressure from the air in the rear wall interior cavity will move the flexible diaphragm 72 away from the rear wall interior cavity 50 and toward the circular chamber 70 of the fuel delivery ring 38. These movements of the flexible diaphragm 72 modulate the pressure within the fuel accumulation chamber 60, 70, and therefore modulate the pressure leading from the fuel accumulator toward the engine of the vehicle.

[00030] The structural configuration of the front wall 14, rear wall 16, and fuel delivery ring 18 are such that these components can be detached from one another and rotated about the central axis 71. For example, Figs. 2 and 3 show the fuel delivery ring oriented with its outlet ports 40 and 42 facing away from inlet port 44, whereas Fig. 4 shows the outlet ports 40 and 42 facing laterally with respect to inlet port 44. This permits the engineer or mechanic that is installing or maintaining the fuel accumulator to orient the fuel delivery ring 38 so that its outlet ports 40 and 42 face in a desired direction for connection to fuel lines.

[00031] It will be noted that the sight glass 26 will always be aligned with the filter 76 for the purpose of visually inspecting the surface of the filter that faces the unfiltered fuel chamber 60.

[00032] Although preferred embodiments of the invention has been disclosed in detail herein, it will be obvious to those skilled in the art that variations and modifications of

the disclosed embodiments can be made without departing from the spirit and scope of the invention as set forth in the following claims.